fx-82MS
fx-85MS
fx-220 PLUS
fx-300MS
fx-350MS
(2nd edition / S-V.P.A.M.)

User's Guide

CASIO Worldwide Education Website

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CASIO®

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Before Using the Calculator

About this Manual

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- Unless specifically stated, all sample operations in this manual assume that the calculator is in its initial default setup. Use the procedure under "Initializing the Calculator" to return the calculator to its initial default setup.
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- The displays and illustrations (such as key markings) shown in this manual are for illustrative purposes only, and may differ somewhat from the actual items they represent.
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Initializing the Calculator

Perform the following procedure when you want to initialize the calculator and return the calculation mode and setup to their initial default settings. Note that this operation also clears all data currently in calculator memory.
fx-82MS/fx-85MS/fx-300MS/fx-350MS: [ON] [SHIFT] [MODE] (CLR) [3] (All) [=]
fx-220 PLUS: [ON] [CLR] [3] (All) [=]

Precautions

Be sure to read the following safety precautions before using the calculator.

Safety Precautions

⚠ **Battery**
- Keep batteries out of the reach of small children.

- Use only the type of battery specified for this calculator in this manual.

Handling Precautions

- Even if the calculator is operating normally, replace the battery according to the schedule shown below. Continued use after the specified number of years may result in abnormal operation. Replace the battery immediately after display figures become dim.
    fx-82MS/fx-220 PLUS: Every two years
    fx-85MS/fx-300MS/fx-350MS: Every three years
- A dead battery can leak, causing damage to and malfunction of the calculator. Never leave a dead battery in the calculator.
- **The battery that comes with the calculator is for factory testing, and it discharges slightly during shipment and storage. Because of these reasons, its battery life may be shorter than normal.**
- Do not use a nickel-based primary battery with this product. Incompatibility between such batteries and product specifications can result in shorter battery life and product malfunction.
- Avoid use and storage of the calculator in areas subjected to temperature extremes, and large amounts of humidity and dust.
- Do not subject the calculator to excessive impact, pressure, or bending.
- Never try to take the calculator apart.
- Use a soft, dry cloth to clean the exterior of the calculator.
- Whenever discarding the calculator or batteries, be sure to do so in accordance with the laws and regulations in your particular area.

Getting Started

Removing the Hard Case

Before using the calculator, slide its hard case downwards to remove it, and then affix the hard case to the back of the calculator as shown in the illustration below.
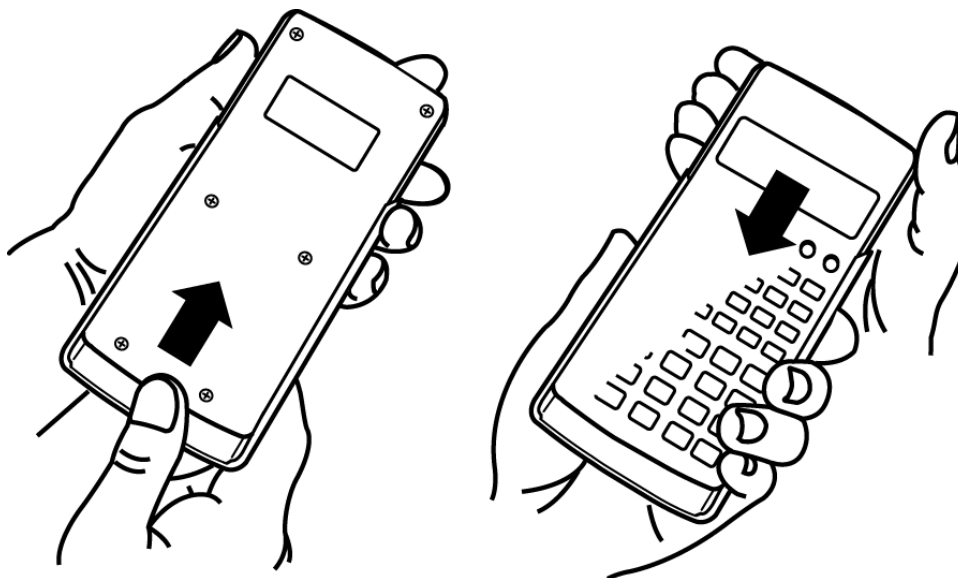
Turning Power On and Off

- Press ⌊ON⌋ to turn on the calculator.
- Press ⌊SHIFT⌋ ⌊AC⌋ (OFF) to turn off the calculator.

Note

- The calculator also will turn off automatically after approximately 10 minutes of non-use. Press the ⌊ON⌋ key to turn the calculator back on.

Adjusting Display Contrast

1. Press ⌊MODE⌋ ⌊MODE⌋ ⌊MODE⌋ ⌊MODE⌋ .
    - This displays the display setup screen.
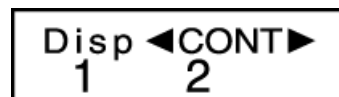
2. Press ⌊2⌋ .
3. Use ◀ and ▶ to adjust display contrast.
4. After the setting is the way you want, press ⌊AC⌋ .

Important!

- If adjusting display contrast does not improve display readability, it probably means that battery power is low. Replace the battery.

Key Markings

fx-82MS/fx-85MS/fx-300MS/fx-350MS: Pressing the ⌊SHIFT⌋ or ⌊ALPHA⌋ key followed by a second key performs the alternate function of the second key.

fx-220 PLUS: Pressing the ⌊SHIFT⌋ key followed by a second key performs the alternate function of the second key.

The alternate function is indicated by the text printed above the key.

fx-82MS/fx-85MS/fx-300MS/
fx-350MS:
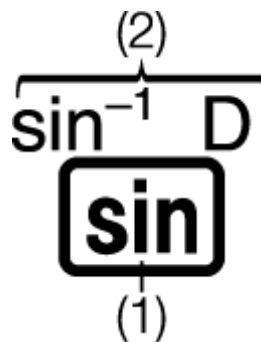
fx-220 PLUS:

(1) Keycap function (2) Alternate function

• The following shows what the different colors of the alternate function key text mean.

If key marking text is this color:	It means this:
Yellow	Press [SHIFT] and then the key to access the applicable function.
Red	Press [ALPHA] and then the key to input the applicable variable, constant, function, or symbol. (fx-82MS/fx-85MS/fx-300MS/ fx-350MS only)
Blue (or enclosed in blue brackets)	Enter the SD Mode and REG Mode to access the function. (fx-82MS/fx-85MS/fx-300MS/ fx-350MS only)

• The following shows an example of how an alternate function operation is represented in this manual.

Example: [SHIFT] [sin] (sin⁻¹)* 1 [=]

* Indicates the function that is accessed by the key operation ([SHIFT] [sin]) before it. Note that this is not part of the actual key operation you perform.

• The following shows an example of how a key operation to select an on-screen menu item is represented in this manual.

Example: [1] (COMP)*

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* Indicates the menu item that is selected by the number key operation ($\boxed{1}$) before it. Note that this is not part of the actual key operation you perform.

- The cursor key is marked with four arrows, indicating direction, as shown in the illustration nearby. In this manual, cursor key operation is indicated as $\bigcirc\!\!\!\blacktriangle$, $\bigcirc\!\!\!\blacktriangledown$, $\bigcirc\!\!\!\blacktriangleleft$, and $\bigcirc\!\!\!\blacktriangleright$.
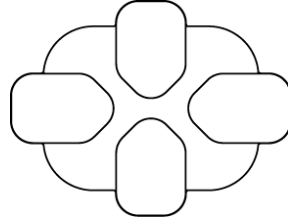
Reading the Display

The two-line display makes it possible to view both the calculation formula and its result at the same time.

(1) Calculation formula
(2) Calculation result
(3) Indicators

- The table below describes some of the typical indicators that appear at the top of the screen (3).

This indicator:	Means this:
S	The keypad has been shifted by pressing the $\boxed{\text{SHIFT}}$ key. The keypad will unshift and this indicator will disappear when you press a key.
A	The alpha input mode has been entered by pressing the $\boxed{\text{ALPHA}}$ key. The alpha input mode will be exited and this indicator will disappear when you press a key. (fx-82MS/fx-85MS/fx-300MS/fx-350MS only)
D/**R**/**G**	Indicates the current setting of Angle Unit (**D**: Degree, **R**: Radian, or **G**: Gradian) on the setup menu.
FIX	A fixed number of decimal places is in effect.

This indicator:	Means this:
SCI	A fixed number of significant digits is in effect.
M	There is a value stored in independent memory.
STO	The calculator is standing by for input of a variable name to assign a value to the variable. This indicator appears after you press [SHIFT] [RCL] (STO). (fx-82MS/fx-85MS/fx-300MS/fx-350MS only)
RCL	The calculator is standing by for input of a variable name to recall the variable's value. This indicator appears after you press [RCL]. (fx-82MS/fx-85MS/fx-300MS/fx-350MS only)

Calculation Modes and Calculator Setup

Calculation Mode

Before starting a calculation, you must first enter the correct mode as indicated in the table below.

fx-82MS/fx-85MS/fx-300MS/fx-350MS

When you want to perform this type of operation:	Perform this key operation:
General calculations	[MODE] [1] (COMP)
Standard deviation	[MODE] [2] (SD)
Regression calculations	[MODE] [3] (REG)

fx-220 PLUS

When you want to perform this type of operation:	Perform this key operation:
General calculations	[MODE] [1] (COMP)
Standard deviation	[MODE] [2] (SD)

> **Note**
>
> - The initial default calculation mode is the COMP Mode.
> - Mode indicators appear in the upper part of the display.
> - The COMP, SD, and REG Modes can be used in combination with the angle unit settings.
> - Be sure to check the current calculation mode (SD, REG, COMP) and angle unit setting (Deg, Rad, Gra) before beginning a calculation.

Configuring the Calculator Setup

Pressing the [MODE] key more than once displays additional setup screens. Underlined (___) settings are initial defaults.

Deg Rad Gra
1   2   3

[1] Deg [2] Rad [3] Gra

Specifies degrees, radians or grads as the angle unit for value input and calculation result display.

(90°= π/2 radians = 100 grads)

Fix Sci Norm
1   2   3

[1] Fix [2] Sci [3] Norm

Specifies the number of digits for display of a calculation result.

Fix: The value you specify (from 0 to 9) controls the number of decimal places for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed.
Example: 100 ÷ 7 = 14.286 (Fix 3)
                    14.29 (Fix 2)

Sci: The value you specify (from 1 to 10) controls the number of significant digits for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed.
Example: 1 ÷ 7 = 1.4286×10^{-1} (Sci 5)
             $1.428571429 \times 10^{-1}$ (Sci 0)

Norm: Selecting one of the two available settings (Norm 1, Norm 2) determines the range in which results will be displayed in exponential format. Outside the specified range, results are displayed using non-exponential format.
Norm 1: $10^{-2} > |x|, |x| \geqq 10^{10}$
Norm 2: $10^{-9} > |x|, |x| \geqq 10^{10}$
Example: 1 ÷ 200 = 5×10^{-3} (Norm 1)
               0.005 (Norm 2)

Disp ◄CONT►
1   2

[1] →

ab/c d/c
1   2

► ↓   ↑ ◄

Dot Comma
1   2
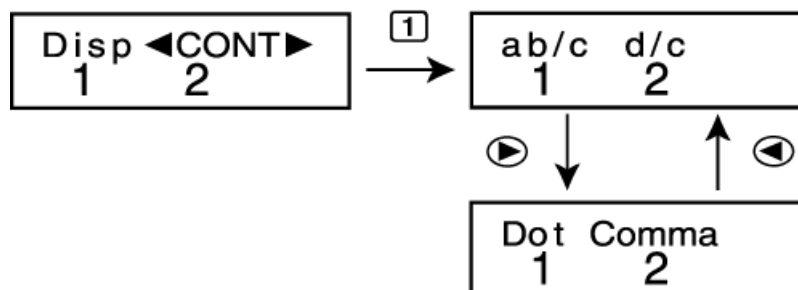
[1] ab/c [2] d/c

Specifies either mixed fraction (ab/c) or improper fraction (d/c) for display of fractions in calculation results.

1 Dot 2 Comma

Specifies whether to display a dot or a comma for the calculation result decimal point. A dot is always displayed during input.

Dot: Period decimal point, comma separator

Comma: Comma decimal point, period separator

Note

- To close the setup menu without selecting anything, press [AC].

Initializing the Calculation Mode and Other Settings

Performing the following procedure initializes the calculation mode and other setup settings as shown below.

fx-82MS/fx-85MS/fx-300MS/fx-350MS: [ON] [SHIFT] [MODE] (CLR) [2] (Mode) [=]

fx-220 PLUS: [ON] [CLR] [2] (Mode) [=]

This setting:	Is initialized to this:
Calculation Mode	COMP
Angle Unit	Deg
Exponential Display Format	Norm 1
Fraction Display Format	a b/c
Decimal Point Character	Dot

- To cancel initialization without doing anything, press [AC] (Cancel) instead of [=].

Basic Calculations

Use the ⌷MODE⌷ key to enter the COMP Mode when you want to perform basic calculations.

⌷MODE⌷ ⌷1⌷(COMP) | ⁻   0. |

Inputting Expression and Values

Example: 4 × sin30 × (30 + 10 × 3) = 120   (Angle unit: Deg)

4 ⌷×⌷ ⌷sin⌷ 30 ⌷×⌷ ⌷(⌷ 30 ⌷+⌷ 10 ⌷×⌷ 3 ⌷)⌷ ⌷=⌷

| 4×sin 30×(30 |
| 120. |

Note

- The memory area used for calculation input can hold 79 "steps". One step is taken up each time you press a number key or arithmetic operator key (⌷+⌷, ⌷−⌷, ⌷×⌷, ⌷÷⌷). A ⌷SHIFT⌷ or ⌷ALPHA⌷ (fx-82MS/fx-85MS/fx-300MS/fx-350MS only) key operation does not take up a step, so inputting ⌷SHIFT⌷ ⌷∧⌷($\sqrt[x]{}$), for example, takes up only one step.
- You can input up to 79 steps for a single calculation. Whenever you input the 73rd step of any calculation, the cursor changes from "_" to "■" to let you know memory is running low. If you need to input more than 79 steps, you should divide your calculation into two or more parts.
- Pressing the ⌷Ans⌷ key recalls the last result obtained, which you can use in a subsequent calculation. See "Using Memory Functions - Answer Memory" for more information about using the ⌷Ans⌷ key.

Making Corrections During Input

- Use ⌷◀⌷ and ⌷▶⌷ to move the cursor to the location you want.
- Press ⌷DEL⌷ to delete the number or function at the current cursor position.
- Press ⌷SHIFT⌷ ⌷DEL⌷(INS) to change to an insert cursor ⌷⌷. Inputting something while the insert cursor is on the display inserts the input at the insert cursor position.
- Pressing ⌷SHIFT⌷ ⌷DEL⌷(INS), or ⌷=⌷ returns to the normal cursor from the insert cursor.

Example 1: To correct cos60 so it becomes sin60

⌷cos⌷60

| cos 60_ |
| 0. |

$$\blacktriangleleft \; \blacktriangleleft \; \blacktriangleleft \; \boxed{\text{sin}}$$

```
sin 60
        0.
```

Example 2: To correct the expression 369 × × 2 so it becomes 369 × 2

$$369\boxed{\times}\;\boxed{\times}2$$

```
369××2_
         0.
```

$$\blacktriangleleft \; \blacktriangleleft \; \boxed{\text{DEL}}$$

```
369×2
        0.
```

Example 3: To correct 2.36^2 so it becomes $\sin 2.36^2$

$$2\boxed{\cdot}36\boxed{x^2}$$

```
2.36²_
        0.
```

$$\blacktriangleleft \; \blacktriangleleft \; \blacktriangleleft \; \blacktriangleleft \; \blacktriangleleft \; \boxed{\text{SHIFT}} \; \boxed{\text{DEL}} \text{(INS)} \boxed{\text{sin}}$$

```
sin 2.36²
        0.
```

Clearing all of the calculation you are inputting
Press $\boxed{\text{AC}}$.

Arithmetic Calculations

• Negative values inside of calculations must be enclosed within
  parentheses. For details, see "Calculation Priority Sequence."
• It is not necessary to enclose a negative exponent within parentheses.
  $\sin 2.34 \times 10^{-5} \rightarrow$ $\boxed{\text{sin}}2\boxed{\cdot}34\boxed{x10^x}\boxed{(-)}5$

Example 1: 23 + 4.5 - 53 = -25.5

$$23\boxed{+}4\boxed{\cdot}5\boxed{-}53\boxed{=} \qquad\qquad -25.5$$

Example 2: 56 × (-12) ÷ (-2.5) = 268.8

$$56\boxed{\times}\;\boxed{(}\;\boxed{(-)}12\boxed{)}\;\boxed{\div}\;\boxed{(}\;\boxed{(-)}2\boxed{\cdot}5\boxed{)}\;\boxed{=} \qquad 268.8$$

Example 3: $2 \div 3 \times (1 \times 10^{20}) = 6.666666667 \times 10^{19}$

$$2\boxed{\div}3\boxed{\times}1\boxed{x10^x}20\boxed{=} \qquad 6.666666667\times10^{19}$$

Example 4: 7 × 8 - 4 × 5 = 36

$$7\boxed{\times}8\boxed{-}4\boxed{\times}5\boxed{=} \qquad\qquad 36.$$

Example 5: $\dfrac{6}{4 \times 5} = 0.3$

$$6 \div (\!(\, 4 \times 5 \,)\!) = \qquad 0.3$$

Example 6: 2 × [7 + 6 × (5 + 4)] = 122

$$2 \times (\!(\, 7 + 6 \times (\!(\, 5 + 4 \,)\!) \,)\!) = \qquad 122.$$

Number of Decimal Places and Number of Significant Digits

To change the settings for the number of decimal places, the number of significant digits, or the exponential display format, press the [MODE] key a number of times until you reach the setup screen shown below.

```
Fix Sci Norm
 1   2   3
```

Press the number key ([1], [2], or [3]) that corresponds to the setup item you want to change.

[1] (Fix): Number of decimal places
[2] (Sci): Number of significant digits
[3] (Norm): Exponential display format

Example 1: 200 ÷ 7 × 14 =

$$200 \div 7 \times 14 = \qquad \boxed{400.}$$

(Specifies three decimal places.)

$$[MODE] \cdots [1](Fix)[3] \qquad \boxed{\begin{array}{r}\text{FIX}\\400.000\end{array}}$$

• Press [MODE] · · · · · [3] (Norm)[1] to clear the Fix specification.

Example 2: 1 ÷ 3, displaying result with two significant digits (Sci 2)

$$[MODE] \cdots [2](Sci)[2] \quad 1 \div 3 = \qquad \boxed{\begin{array}{r}\text{SCI}\\3.3^{-01}\end{array}}$$

• Press [MODE] · · · · · [3] (Norm)[1] to clear the Sci specification.

Omitting a Final Closed Parenthesis

Example: (2 + 3) × (4 - 1 = 15

$$(\!(\, 2 + 3 \,)\!) \times (\!(\, 4 - 1 = \qquad 15.$$

Fraction Calculations

Example 1: $\dfrac{2}{3} + \dfrac{1}{5} = \dfrac{13}{15}$

2 [a⅘] 3 [+] 1 [a⅘] 5 [=]

$\boxed{13 \lrcorner 15.}$

Example 2: $3\dfrac{1}{4} + 1\dfrac{2}{3} = 4\dfrac{11}{12}$

3 [a⅘] 1 [a⅘] 4 [+] 1 [a⅘] 2 [a⅘] 3 [=]

$\boxed{4 \lrcorner 11 \lrcorner 12.}$

Example 3: $\dfrac{1}{2} + 1.6 = 2.1$

1 [a⅘] 2 [+] 1 [.] 6 [=] 2.1

> **Note**
>
> - Values are displayed in decimal format automatically whenever the total number of digits of a fractional value (integer + numerator + denominator + separator marks) exceeds 10.
> - Results of calculations that mix fraction and decimal values are always decimal.

Decimal ↔ Fraction Conversion

To switch a calculation result between fraction and decimal format:
Press [a⅘].

Example 1: $2.75 = 2\dfrac{3}{4}$ (Decimal → Fraction)

2 [.] 75 [=] $\boxed{2.75}$

[a⅘] $\boxed{2 \lrcorner 3 \lrcorner 4.}$

$= \dfrac{11}{4}$ [SHIFT] [a⅘] (d/c) $\boxed{11 \lrcorner 4.}$

Example 2: $\dfrac{1}{2} \leftrightarrow 0.5$ (Fraction ↔ Decimal)

1 [a⅘] 2 [=] $\boxed{1 \lrcorner 2.}$

[a⅘] $\boxed{0.5}$

[a⅘] $\boxed{1 \lrcorner 2.}$

▍Mixed Fraction ↔ Improper Fraction Conversion

To switch a calculation result between improper fraction and mixed fraction format:
Press [SHIFT] [a½] (d/c).

Example 1: $1\frac{2}{3} \leftrightarrow \frac{5}{3}$

1 [a½] 2 [a½] 3 [=]	1⌐2⌐3.
[SHIFT] [a½] (d/c)	5⌐3.
[SHIFT] [a½] (d/c)	1⌐2⌐3.

> **Note**
>
> - You can use the display setup (Disp) screen to specify the display format when a fraction calculation result is greater than one.
> - To change the fraction display format, press the [MODE] key a number of times until you reach the setup screen shown below.
>
> $$\text{Disp} \blacktriangleleft \text{CONT} \blacktriangleright \\ 1 \qquad 2$$
>
> Display the selection screen.
> [1] (Disp)
>
> $$ab/c \quad d/c \\ 1 \qquad 2$$
>
> Press the number key ([1] or [2]) that corresponds to the setting you want to use.
> [1] (ab/c): Mixed fraction
> [2] (d/c): Improper fraction
> - An error occurs if you try to input a mixed fraction while the d/c display format is selected.

Percent Calculations

Calculation Type	Calculation Formula	Calculation Method and Key Operations
Percentage Example 1	$\frac{A \times B}{100}$	What is B percent of A? A [×] B [SHIFT] [=] (%)

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Calculation Type	Calculation Formula	Calculation Method and Key Operations
Ratio Example 2	$\dfrac{A}{B} \times 100$	What percent of B is A? A ÷ B [SHIFT] [=] (%)
Premium Example 3	$A + \dfrac{A \times B}{100}$	What is A increased by B percent? A [×] B [SHIFT] [=] (%) [+]
Discount Example 4 Example 5	$A - \dfrac{A \times B}{100}$	What is A decreased by B percent? A [×] B [SHIFT] [=] (%) [−]
Rate of Change (1) Example 6	$\dfrac{A + B}{B} \times 100$	If A is added to B, by what percent does B change? A [+] B [SHIFT] [=] (%)
Rate of Change (2) Example 7	$\dfrac{A - B}{B} \times 100$	If B becomes A, by what percent does B change? A [−] B [SHIFT] [=] (%)

Example 1: To calculate 12% of 1500   (180)

1500 [×] 12 [SHIFT] [=] (%)   180.

Example 2: To calculate what percentage of 880 is 660   (75%)

660 [÷] 880 [SHIFT] [=] (%)   75.

Example 3: To increase 2500 by 15%   (2875)

2500 [×] 15 [SHIFT] [=] (%) [+]   2875.

Example 4: To decrease 3500 by 25%   (2625)

3500 [×] 25 [SHIFT] [=] (%) [−]   2625.

Example 5: To decrease the sum of 168, 98, and 734 by 20%   (800)
fx-82MS/fx-85MS/fx-300MS/fx-350MS:

168 ⊞ 98 ⊞ 734 ⊟ [Ans] [SHIFT] [RCL] (STO) [(−)] (A)

[ALPHA] [(−)] (A)* ⊠ 20 [SHIFT] ⊟ (%) ⊟   800.

* As shown here, if you want to use the current Answer Memory value in a mark up or discount calculation, you need to assign the Answer Memory value into a variable and then use the variable in the mark up/discount calculation. This is because the calculation performed when ⊟ (%) is pressed stores a result to Answer Memory before the ⊟ key is pressed.

fx-220 PLUS:

168 ⊞ 98 ⊞ 734 ⊟ [SHIFT] [MR] (Min)

[MR] ◄ ⊠ 20 [SHIFT] ⊟ (%) ⊟   800.

Example 6: 300 grams are added to a test sample originally weighing 500 grams, producing a final test sample of 800 grams. What percent of 500 grams is 800 grams?   (160%)

300 ⊞ 500 [SHIFT] ⊟ (%)   160.

Example 7: What is the percentage change when a value is increased from 40 to 46? How about to 48?   (15%, 20%)

46 ⊟ 40 [SHIFT] ⊟ (%)   15.

◄ ◄ ◄ ◄ ◄ ◄ 8 ⊟   20.

Degree, Minute, Second (Sexagesimal) Calculations

You can perform calculations using sexagesimal values, and convert values between sexagesimal and decimal.

Inputting Sexagesimal Values

The following is the syntax for inputting a sexagesimal value.
   {Degrees} [° ' "] {Minutes} [° ' "] {Seconds} [° ' "]

• Note that you must always input something for the degrees and minutes, even if they are zero.
Example: Input 2°0'30"

2 [° ' "] 0 [° ' "] 30 [° ' "] ⊟   2°0°30.

Sexagesimal Calculations

Performing the following types of sexagesimal calculations produces a sexagesimal result.
- Addition or subtraction of two sexagesimal values
- Multiplication or division of a sexagesimal value and a decimal value

Example 1: 2°20'30" + 39'30"

2 ⌈°'"⌉ 20 ⌈°'"⌉ 30 ⌈°'"⌉ ⊞ 0 ⌈°'"⌉ 39 ⌈°'"⌉ 30 ⌈°'"⌉ ⌈=⌉	3°0°0.

Example 2: 12°34'56" × 3.45

12 ⌈°'"⌉ 34 ⌈°'"⌉ 56 ⌈°'"⌉ ⌈×⌉ 3 ⌈·⌉ 45 ⌈=⌉	43°24°31.2

Converting Values between Sexagesimal and Decimal

Example: To convert the decimal value 2.258 to a sexagesimal value and then back to a decimal value

2 ⌈·⌉ 258 ⌈=⌉	2.258
⌈SHIFT⌉ ⌈°'"⌉ (←)	2°15°28.8
⌈°'"⌉	2.258

Multi-Statements (fx-82MS/fx-85MS/fx-300MS/fx-350MS only)

You can use the colon character (:) to connect two or more expressions and execute them in sequence from left to right when you press ⌈=⌉.

Example: To add 2 + 3 and then multiply the result by 4

2 ⊞ 3 ⌈ALPHA⌉ ⌈Pol(⌉ (:) ⌈Ans⌉ ⌈×⌉ 4 ⌈=⌉

```
2+3
              5. Disp
```

⌈=⌉
```
Ans×4
              20.
```

Using Engineering Notation

A simple key operation transforms a displayed value to engineering notation.

Example 1: To convert 56088 meters to kilometers → 56.088 × 10^3 (km)

$$56088 \; \boxed{=} \; \boxed{\text{ENG}} \qquad\qquad 56.088 \times 10^{03}$$

Example 2: To convert 0.08125 grams to milligrams → 81.25 × 10^{-3} (mg)

$$0 \; \boxed{\cdot} \; 08125 \; \boxed{=} \; \boxed{\text{ENG}} \qquad\qquad 81.25 \times 10^{-03}$$

Example 3: Transform the value 1234 to engineering notation, shifting the decimal point to the right.

$$1234 \; \boxed{=} \qquad\qquad 1234.$$

$$\boxed{\text{ENG}} \qquad\qquad 1.234 \times 10^{03}$$

$$\boxed{\text{ENG}} \qquad\qquad 1234. \times 10^{00}$$

Example 4: Transform the value 123 to engineering notation, shifting the decimal point to the left.

$$123 \; \boxed{=} \qquad\qquad 123.$$

$$\boxed{\text{SHIFT}} \; \boxed{\text{ENG}} \; (\leftarrow) \qquad\qquad 0.123 \times 10^{03}$$

$$\boxed{\text{SHIFT}} \; \boxed{\text{ENG}} \; (\leftarrow) \qquad\qquad 0.000123 \times 10^{06}$$

Calculation History and Replay

Calculation History

In the COMP Mode, the calculator remembers up to approximately 150 bytes of data for the newest calculation.

An ▲ and/or ▼ at the top of the display indicates that there is more calculation history content above and/or below.

You can scroll through calculation history contents using ⏶ and ⏷.

Example:

1 + 1 = 2	1 $\boxed{+}$ 1 $\boxed{=}$	2.
2 + 2 = 4	2 $\boxed{+}$ 2 $\boxed{=}$	4.
3 + 3 = 6	3 $\boxed{+}$ 3 $\boxed{=}$	6.
	(Scrolls back.) ⏶	4.
	(Scrolls back again.) ⏶	2.

▍Replay

While a calculation result is on the display, you can press ◀ or ▶ to edit the expression you used for the previous calculation.

Example: <u>4 × 3</u> + 2 = 14
      <u>4 × 3</u> - 7 = 5

	4 ⌷×⌷ 3 ⌷+⌷ 2 ⌷=⌷	14.
(Continuing)	◀ ⌷DEL⌷ ⌷DEL⌷ ⌷-⌷ 7 ⌷=⌷	5.

Using Memory Functions

▍Answer Memory (Ans)

- Whenever you press ⌷=⌷ after inputting values or an expression, the calculated result automatically updates Answer Memory contents by storing the result.
- fx-82MS/fx-85MS/fx-300MS/fx-350MS: In addition to ⌷=⌷, Answer Memory contents are also updated with result whenever you press ⌷SHIFT⌷ ⌷=⌷ (%), ⌷M+⌷, ⌷SHIFT⌷ ⌷M+⌷ (M-), or ⌷SHIFT⌷ ⌷RCL⌷ (STO) followed by a letter (A through F, or M, X, or Y).
  fx-220 PLUS: In addition to ⌷=⌷, Answer Memory contents are also updated with result whenever you press ⌷SHIFT⌷ ⌷=⌷ (%), ⌷M+⌷, ⌷SHIFT⌷ ⌷M+⌷ (M-), or ⌷SHIFT⌷ ⌷MR⌷ (Min).
- You can recall Answer Memory contents by pressing ⌷Ans⌷.
- Answer Memory can store up to 15 digits for the mantissa and two digits for the exponent.
- Answer Memory contents are not updated if the operation performed by any of the above key operations results in an error.

Consecutive Calculations
- You can use the calculation result that is currently on the display (and also stored in Answer Memory) as the first value of your next calculation. Note that pressing an operator key while a result is displayed causes the displayed value to change to Ans, indicating it is the value that is currently stored in Answer Memory.
- The result of a calculation can also be used with a subsequent Type A function (x^2, x^3, x^{-1}, $x!$, DRG▶), +, -, x^y, $\sqrt[x]{}$, ×, ÷, $n\mathrm{P}r$ and $n\mathrm{C}r$.

Example 1: To divide the result of 3 × 4 by 30

3 [×] 4 [=]   12.

(Continuing) [÷] 30 [=]

$$Ans \div 30$$
$$0.4$$

Example 2: To perform the calculations shown below:

123 + 456 = 579   789 - 579 = 210

123 [+] 456 [=]   579.

(Continuing) 789 [−] [Ans] [=]   210.

Variables (A, B, C, D, E, F, M, X, Y) (fx-82MS/ fx-85MS/fx-300MS/fx-350MS only)

Your calculator has nine preset variables named A, B, C, D, E, F, M, X, and Y. You can assign values to variables and use the variables in calculations.

Example:

To assign the result of 3 + 5 to variable A

3 [+] 5 [SHIFT] [RCL] (STO) [(−)] (A)   8.

To multiply the contents of variable A by 10

(Continuing) [ALPHA] [(−)] (A) [×] 10 [=]   80.

To recall the contents of variable A

(Continuing) [RCL] [(−)] (A)   8.

To clear the contents of variable A

0 [SHIFT] [RCL] (STO) [(−)] (A)   0.

Independent Memory (M)

You can add calculation results to or subtract results from independent memory.
The "M" indicator appears on the display when there is any value other than zero stored in independent memory.

Example 1:

To clear the contents of M
fx-82MS/fx-85MS/fx-300MS/fx-350MS:

0 [SHIFT] [RCL] (STO) [M+] (M)	0.

fx-220 PLUS:

0 [SHIFT] [MR] (Min)	0.

To add the result of 10 × 5 to M

(Continuing) 10 [×] 5 [M+]	50.

To subtract the result of 10 + 5 from M

(Continuing) 10 [+] 5 [SHIFT] [M+] (M-)	15.

To recall the contents of M
fx-82MS/fx-85MS/fx-300MS/fx-350MS:

(Continuing) [RCL] [M+] (M)	35.

fx-220 PLUS:

(Continuing) [MR]	35.

Example 2:

$$23 + 9 = 32$$
$$53 - 6 = 47$$
$$-) 45 \times 2 = 90$$
$$\underline{99 \div 3 = 33}$$
(Total)   22

fx-82MS/fx-85MS/fx-300MS/fx-350MS:

23 [+] 9 [SHIFT] [RCL] (STO) [M+] (M)	32.
53 [−] 6 [M+]	47.
45 [×] 2 [SHIFT] [M+] (M-)	90.
99 [÷] 3 [M+]	33.
[RCL] [M+] (M)	22.

fx-220 PLUS:

23 [+] 9 [SHIFT] [MR] (Min)	32.

53 ⊟ 6 M+	47.
45 ⊠ 2 SHIFT M+ (M-)	90.
99 ÷ 3 M+	33.
MR	22.

Clearing the Contents of All Memories

Independent memory and variable contents are retained even if you press AC, or turn off the calculator.

Perform the following procedure when you want to clear the contents of all memories.

fx-82MS/fx-85MS/fx-300MS/fx-350MS: ON SHIFT MODE (CLR) 1 (Mcl) =

fx-220 PLUS: ON CLR 1 (Mcl) =

Function Calculations

Use the ⌷MODE⌷ key to enter the COMP Mode when you want to perform function calculations.

⌷MODE⌷ ⌷1⌷(COMP)

⏐ ‾   0.

Using functions can slow down a calculation, which may delay display of the result. To interrupt an ongoing calculation before its result appears, press ⌷AC⌷.

Pi (π), Natural Logarithm Base e

Pi (π)

You can input pi (π) into a calculation.
The following shows the required key operations and the values this calculator uses for pi (π).

π = 3.14159265358980 (⌷SHIFT⌷ ⌷x10^x⌷ (π))

π is displayed as 3.141592654, but π = 3.14159265358980 is used for internal calculations.

Natural Logarithm Base e (fx-82MS/fx-85MS/ fx-300MS/fx-350MS only)

You can input natural logarithm base e into a calculation.
The following shows the required key operations and the values this calculator uses for e.

e = 2.71828182845904 (⌷ALPHA⌷ ⌷ln⌷ (e))

e is displayed as 2.718281828, but e = 2.71828182845904 is used for internal calculations.

Trigonometric Functions, Inverse Trigonometric Functions

Trigonometric Functions

- To change the default angle unit (degrees, radians, grads), press the ⌷MODE⌷ key a number of times until you reach the angle unit setup screen shown below.

```
Deg Rad Gra
1    2    3
```

- Press the number key ($\boxed{1}$, $\boxed{2}$, or $\boxed{3}$) that corresponds to the angle unit you want to use.
  (90° = $\pi/2$ radians = 100 grads)

Example 1: sin 30° = 0.5 (Angle unit: Deg)

$\boxed{\text{MODE}}$ · · · · · $\boxed{1}$ (Deg)

$\boxed{\text{sin}}$ 30 $\boxed{=}$ 0.5

Example 2: $\cos(\frac{\pi}{3})$ = 0.5 (Angle unit: Rad)

$\boxed{\text{MODE}}$ · · · · · $\boxed{2}$ (Rad)

$\boxed{\text{cos}}$ $\boxed{(}$ $\boxed{\text{SHIFT}}$ $\boxed{\text{x10}^x}$ (π) $\boxed{\div}$ 3 $\boxed{)}$ $\boxed{=}$ 0.5

Example 3: tan(-35) = -0.612800788 (Angle unit: Gra)

$\boxed{\text{MODE}}$ · · · · · $\boxed{3}$ (Gra)

$\boxed{\text{tan}}$ $\boxed{(}$ $\boxed{(-)}$ 35 $\boxed{)}$ $\boxed{=}$ -0.612800788

Inverse Trigonometric Functions

Example 1: $\sin^{-1}$ 0.5 = 30° (Angle unit: Deg)

$\boxed{\text{MODE}}$ · · · · · $\boxed{1}$ (Deg)

$\boxed{\text{SHIFT}}$ $\boxed{\text{sin}}$ ($\sin^{-1}$) 0 $\boxed{\cdot}$ 5 $\boxed{=}$ 30.

Example 2: $\cos^{-1} \frac{\sqrt{2}}{2}$ = 0.25 π (= $\frac{\pi}{4}$) (Angle unit: Rad)

$\boxed{\text{MODE}}$ · · · · · $\boxed{2}$ (Rad)

$\boxed{\text{SHIFT}}$ $\boxed{\text{cos}}$ ($\cos^{-1}$) $\boxed{(}$ $\boxed{\sqrt{}}$ 2 $\boxed{\div}$ 2 $\boxed{)}$ $\boxed{=}$

$\boxed{\text{Ans}}$ $\boxed{\div}$ $\boxed{\text{SHIFT}}$ $\boxed{\text{x10}^x}$ (π) $\boxed{=}$ 0.25

Example 3: $\tan^{-1}$ 0.741 = 36.53844577° (Angle unit: Deg)

$\boxed{\text{MODE}}$ · · · · · $\boxed{1}$ (Deg)

$\boxed{\text{SHIFT}}$ $\boxed{\text{tan}}$ ($\tan^{-1}$) 0 $\boxed{\cdot}$ 741 $\boxed{=}$ 36.53844577

Hyperbolic Functions, Inverse Hyperbolic Functions

Example 1: sinh 3.6 = 18.28545536

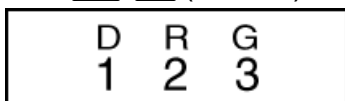| $\boxed{\text{hyp}}$ $\boxed{\text{sin}}$ (sinh) 3 $\boxed{\cdot}$ 6 $\boxed{=}$	18.28545536

Example 2: sinh^{-1} 30 = 4.094622224

$\boxed{\text{hyp}}$ $\boxed{\text{SHIFT}}$ $\boxed{\text{sin}}$ (sinh^{-1}) 30 $\boxed{=}$	4.094622224

Angle Unit Conversion

Press $\boxed{\text{SHIFT}}$ $\boxed{\text{Ans}}$ (DRG▶) to display the following menu.

```
D   R   G
1   2   3
```

Pressing $\boxed{1}$, $\boxed{2}$, or $\boxed{3}$ converts the displayed value to the corresponding angle unit.

Example: To convert the 4.25 radians to degrees

$\boxed{\text{MODE}}$ · · · · · $\boxed{1}$ (Deg)
4 $\boxed{\cdot}$ 25 $\boxed{\text{SHIFT}}$ $\boxed{\text{Ans}}$ (DRG▶) $\boxed{2}$ (R) $\boxed{=}$

```
4.25ʳ
243.5070629
```

Exponential Functions, Logarithmic Functions

Exponential Functions

Example 1: e^{10} = 22026.46579

$\boxed{\text{SHIFT}}$ $\boxed{\text{ln}}$ (e^x) 10 $\boxed{=}$	22026.46579

Example 2: $10^{1.5}$ = 31.6227766

$\boxed{\text{SHIFT}}$ $\boxed{\text{log}}$ (10^x) 1 $\boxed{\cdot}$ 5 $\boxed{=}$	31.6227766

Example 3: 2^{-3} = 0.125

2 $\boxed{\wedge}$ $\boxed{(-)}$ 3 $\boxed{=}$	0.125

Example 4: $(-2)^4$ = 16

$\boxed{(}$ $\boxed{(-)}$ 2 $\boxed{)}$ $\boxed{\wedge}$ 4 $\boxed{=}$	16.

> **Note**
>
> • Negative values inside of calculations must be enclosed within parentheses. For details, see "Calculation Priority Sequence."

Logarithmic Functions

Example 1: log 1.23 = 0.089905111

$$\boxed{\text{log}}\ 1\ \boxed{\cdot}\ 23\ \boxed{=} \qquad\qquad 0.089905111$$

Example 2: ln 90 (= $\log_e 90$) = 4.49980967

$$\boxed{\text{ln}}\ 90\ \boxed{=} \qquad\qquad 4.49980967$$

Example 3: ln e = 1 (fx-82MS/fx-85MS/fx-300MS/fx-350MS only)

$$\boxed{\text{ln}}\ \boxed{\text{ALPHA}}\ \boxed{\text{ln}}\ (\,e\,)\ \boxed{=} \qquad\qquad 1.$$

Power Functions and Power Root Functions

Example 1: $\sqrt{2} + \sqrt{3} \times \sqrt{5}$ = 5.287196909

$$\boxed{\sqrt{\ }}\,2\ \boxed{+}\ \boxed{\sqrt{\ }}\,3\ \boxed{\times}\ \boxed{\sqrt{\ }}\,5\ \boxed{=} \qquad\qquad 5.287196909$$

Example 2: $\sqrt[3]{5} + \sqrt[3]{-27}$ = -1.290024053

$$\boxed{\text{SHIFT}}\ \boxed{x^3}\,(\sqrt[3]{\ })\ 5\ \boxed{+}\ \boxed{\text{SHIFT}}\ \boxed{x^3}\,(\sqrt[3]{\ })\ \boxed{(}\ \boxed{(-)}\,27\ \boxed{)}\ \boxed{=} \qquad -1.290024053$$

Example 3: $\sqrt[7]{123}$ (= $123^{\frac{1}{7}}$) = 1.988647795

$$7\ \boxed{\text{SHIFT}}\ \boxed{\wedge}\,(\sqrt[x]{\ })\ 123\ \boxed{=} \qquad\qquad 1.988647795$$

Example 4: $123 + 30^2$ = 1023

$$123\ \boxed{+}\ 30\ \boxed{x^2}\ \boxed{=} \qquad\qquad 1023.$$

Example 5: 12^3 = 1728

$$12\ \boxed{x^3}\ \boxed{=} \qquad\qquad 1728.$$

Example 6: $\dfrac{1}{\frac{1}{3} - \frac{1}{4}}$ = 12

$$\boxed{(}\,3\ \boxed{x^{-1}}\ \boxed{-}\,4\ \boxed{x^{-1}}\ \boxed{)}\ \boxed{x^{-1}}\ \boxed{=} \qquad\qquad 12.$$

Rectangular-Polar Coordinate Conversion

Pol converts rectangular coordinates to polar coordinates, while Rec converts polar coordinates to rectangular coordinates.

$$\text{Pol}(x, y) = (r, \theta) \qquad \text{Rec}(r, \theta) = (x, y)$$

(1)   (2)

(1) Rectangular Coordinates (Rec)
(2) Polar Coordinates (Pol)

Specify the angle unit before performing calculations.
Calculation result θ is displayed in the range of -180° < θ ≦ 180°.
Calculation results are automatically assigned to variables E and F.
(fx-82MS/fx-85MS/fx-300MS/fx-350MS only)

Example 1: To convert polar coordinates (r = 2, θ = 60°) to rectangular coordinates (x, y)　(Angle unit: Deg)
fx-82MS/fx-85MS/fx-300MS/fx-350MS:

x = 1

           [SHIFT] [Pol(] (Rec() 2 [,] 60 [)] [=]   1.

y = 1.732050808

                   [RCL] [tan] (F)   1.732050808

- Press [RCL] [cos] (E) to display the value of x, or [RCL] [tan] (F) to display the value of y.

fx-220 PLUS:

x = 1

           [Rec(] 2 [SHIFT] [(] (,) 60 [)] [=]   1.

y = 1.732050808

              [SHIFT] [Rec(] (y, θ) [=]   1.732050808

- Press [SHIFT] [Pol(] (x, r) [=] to display the value of x, or [SHIFT] [Rec(] (y, θ) [=] to display the value of y.

Example 2: To convert rectangular coordinates (1, √3) to polar coordinates (r , θ)   (Angle unit: Rad)
fx-82MS/fx-85MS/fx-300MS/fx-350MS:

r = 2

[Pol(] 1 [,] [√]3 [)] [=]   2.

θ = 1.047197551

[RCL] [tan] (F)   1.047197551

- Press [RCL] [cos] (E) to display the value of r , or [RCL] [tan] (F) to display the value of θ .

fx-220 PLUS:

r = 2

[Pol(] 1 [SHIFT] [(] (,) [√]3 [)] [=]   2.

θ = 1.047197551

[SHIFT] [Rec(] (y , θ) [=]   1.047197551

- Press [SHIFT] [Pol(] (x , r) [=] to display the value of r , or [SHIFT] [Rec(] (y , θ) [=] to display the value of θ .

Factorial (!)

This function obtains the factorials of a value that is zero or a positive integer.

Example: (5 + 3)! = 40320

[(] 5 [+] 3 [)] [SHIFT] [x^{-1}] (x !) [=]   40320.

Random Number (Ran#)

Function that generates a pseudo random number in the range of 0.000 to 0.999.

Example: Generate three 3-digit random numbers.
The random 3 digit decimal values are converted to 3-digit integer values by multiplying by 1000.
Note that the values shown here are examples only. Values actually generated by your calculator will be different.

1000 [SHIFT] [.] (Ran#) [=]   634.

$\boxed{=}$ 92.

$\boxed{=}$ 175.

Random Integer (RanInt#) (fx-220 PLUS only)

For input of the function of the form RanInt#(a, b), which generates a random integer within the range of a to b.

Example: To generate a random integer in the range of 1 to 6.
Note that the values shown here are examples only. Values actually generated by your calculator will be different.

$\boxed{\text{SHIFT}}$ $\boxed{2}$ (RanInt) 1 $\boxed{\text{SHIFT}}$ $\boxed{(}$ (,) 6 $\boxed{)}$ $\boxed{=}$ 2.

$\boxed{=}$ 4.

$\boxed{=}$ 1.

Permutation ($n \mathrm{P} r$) and Combination ($n \mathrm{C} r$)

These functions make it possible to perform permutation and combination calculations.
n and r must be integers in the range of $0 \leqq r \leqq n < 1 \times 10^{10}$.

Example 1: To determine how many different 4-digit values can be produced using the numbers 1 through 7
 • Numbers cannot be duplicated within the same 4-digit value (1234 is allowed, but 1123 is not).

7 $\boxed{\text{SHIFT}}$ $\boxed{n\text{Cr}}$ ($n \mathrm{P} r$) 4 $\boxed{=}$ 840.

Example 2: To determine how many different 4-member groups can be organized in a group of 10 individuals

10 $\boxed{n\text{Cr}}$ 4 $\boxed{=}$ 210.

Rounding function (Rnd)

Using the Rnd function causes decimal fraction values of the argument to be rounded in accordance with the current number of display digits setting (Norm, Fix, Sci). With Norm 1 or Norm 2, the argument is rounded off to 10 digits.

Example: To perform the following calculations when Fix 3 is selected for the number of display digits: 10 ÷ 3 × 3 and Rnd(10 ÷ 3) × 3

[MODE] · · · · · [1] (Fix) [3]

10 [÷] 3 [×] 3 [=]	10.000
10 [÷] 3 [=] [SHIFT] [0] (Rnd) [×] 3 [=]	9.999

Using Calculation Modes

Statistical Calculations (SD, <u>REG</u>*) * fx-82MS/fx-85MS/fx-300MS/ fx-350MS only

▎Standard Deviation (SD)

> Use the ⌷MODE⌷ key to enter the SD Mode when you want to perform statistical calculations using standard deviation.
>
> ⌷MODE⌷ ⌷2⌷(SD)
>
> ```
>              SD
>  ─
>              0.
> ```

- In the SD Mode and REG Mode, the ⌷M+⌷ key operates as the ⌷DT⌷ key.
- fx-82MS/fx-85MS/fx-300MS/fx-350MS: Always start data input with ⌷SHIFT⌷ ⌷MODE⌷(CLR)⌷1⌷(Scl)⌷=⌷ to clear statistical memory.
  fx-220 PLUS: Always start data input with ⌷CLR⌷ ⌷1⌷(Scl)⌷=⌷ to clear statistical memory.
- Input data using the key sequence shown below.
  $<x$-data> ⌷DT⌷
- Input data is used to calculate values for n, Σx, Σx^2, $\bar{x}$, σ_n and s_x, which you can recall using the key operations noted nearby.

To recall this type of value:	Perform this key operation:	
	fx-82MS/fx-85MS/ fx-300MS/fx-350MS	fx-220 PLUS
Σx^2	⌷SHIFT⌷ ⌷1⌷(S-SUM)⌷1⌷(Σx^2)	⌷SHIFT⌷ ⌷4⌷(Σx^2)
Σx	⌷SHIFT⌷ ⌷1⌷(S-SUM)⌷2⌷(Σx)	⌷SHIFT⌷ ⌷5⌷(Σx)
n	⌷SHIFT⌷ ⌷1⌷(S-SUM)⌷3⌷(n)	⌷SHIFT⌷ ⌷6⌷(n)
$\bar{x}$	⌷SHIFT⌷ ⌷2⌷(S-VAR)⌷1⌷($\bar{x}$)	⌷SHIFT⌷ ⌷7⌷($\bar{x}$)
σ_x	⌷SHIFT⌷ ⌷2⌷(S-VAR)⌷2⌷(σ_x)	⌷SHIFT⌷ ⌷8⌷(σ_x)
s_x	⌷SHIFT⌷ ⌷2⌷(S-VAR)⌷3⌷(s_x)	⌷SHIFT⌷ ⌷9⌷(s_x)

Example: To calculate s_x, σ_x, $\bar{x}$, n, Σx, and Σx^2 for the following data :
55, 54, 51, 55, 53, 53, 54, 52
fx-82MS/fx-85MS/fx-300MS/fx-350MS:

In the SD Mode:
[SHIFT] [MODE] (CLR) [1] (Scl) [=] (Stat clear)

55 [DT]

Each time you press [DT] to register your input, the number of data input up to that point is indicated on the display (n value).

54 [DT] 51 [DT] 55 [DT] 53 [DT] [DT] 54 [DT] 52 [DT]

Sample Standard Deviation (s_x) = 1.407885953

[SHIFT] [2] (S-VAR) [3] (s_x) [=]   1.407885953

Population Standard Deviation (σ_x) = 1.316956719

[SHIFT] [2] (S-VAR) [2] (σ_x) [=]   1.316956719

Arithmetic Mean ($\bar{x}$) = 53.375

[SHIFT] [2] (S-VAR) [1] ($\bar{x}$) [=]   53.375

Number of Data (n) = 8

[SHIFT] [1] (S-SUM) [3] (n) [=]   8.

Sum of Values (Σx) = 427

[SHIFT] [1] (S-SUM) [2] (Σx) [=]   427.

Sum of Squares of Values (Σx^2) = 22805

[SHIFT] [1] (S-SUM) [1] (Σx^2) [=]   22805.

fx-220 PLUS:

In the SD Mode:
[CLR] [1] (Scl) [=] (Stat clear)

55 [DT]

Each time you press [DT] to register your input, the number of data input up to that point is indicated on the display (n value).

54 [DT] 51 [DT] 55 [DT] 53 [DT] [DT] 54 [DT] 52 [DT]

Sample Standard Deviation (s_x) = 1.407885953

[SHIFT] [9] (s_x) [=]   1.407885953

Population Standard Deviation (σ_x) = 1.316956719

$\boxed{\text{SHIFT}}\ \boxed{8}\ (\sigma_x)\ \boxed{=}$	1.316956719

Arithmetic Mean ($\bar{x}$) = 53.375

$\boxed{\text{SHIFT}}\ \boxed{7}\ (\bar{x})\ \boxed{=}$	53.375

Number of Data (n) = 8

$\boxed{\text{SHIFT}}\ \boxed{6}\ (n)\ \boxed{=}$	8.

Sum of Values (Σx) = 427

$\boxed{\text{SHIFT}}\ \boxed{5}\ (\Sigma x)\ \boxed{=}$	427.

Sum of Squares of Values (Σx^2) = 22805

$\boxed{\text{SHIFT}}\ \boxed{4}\ (\Sigma x^2)\ \boxed{=}$	22805.

Data Input Precautions
- $\boxed{\text{DT}}\ \boxed{\text{DT}}$ inputs the same data twice.
- fx-82MS/fx-85MS/fx-300MS/fx-350MS: You can also input multiple entries of the same data using $\boxed{\text{SHIFT}}\ \boxed{,}$ (;). To input the data 110 ten times, for example, press 110 $\boxed{\text{SHIFT}}\ \boxed{,}$ (;) 10 $\boxed{\text{DT}}$.
  fx-220 PLUS: You can also input multiple entries of the same data using $\boxed{\text{SHIFT}}\ \boxed{)}$ (;). To input the data 110 ten times, for example, press 110 $\boxed{\text{SHIFT}}$ $\boxed{)}$ (;) 10 $\boxed{\text{DT}}$.
- You can perform the above key operations in any order, and not necessarily that shown above.
- While inputting data or after inputting data is complete, you can use the ⏶ and ⏷ keys to scroll through data you have input. If you input multiple entries of the same data using $\boxed{\text{SHIFT}}\ \boxed{,}$ (;) ($\boxed{\text{SHIFT}}\ \boxed{)}$ (;) on the fx-220 PLUS) to specify the data frequency (number of data items) as described above, scrolling through data shows both the data item and a separate screen for the data frequency (Freq).
- You can then edit the displayed data, if you want. Input the new value and then press the $\boxed{=}$ key to replace the old value with the new one. This also means that if you want to perform some other operation (calculation, recall of statistical calculation results, etc.), you should always press the $\boxed{\text{AC}}$ key first to exit data display.
- Pressing the $\boxed{\text{DT}}$ key instead of $\boxed{=}$ after changing a value on the display registers the value you input as a new data item, and leaves the old value as it is.

- You can delete a data value displayed using ⏶ and ⏷ by pressing 〔SHIFT〕〔M+〕(CL). Deleting a data value causes all values following it to be shifted up.
- Data values you register are normally stored in calculator memory. The message "Data Full" appears and you will not be able to input any more data if there is no memory left for data storage. If this happens, press the 〔=〕 key to display the screen shown below.

```
EditOFF ESC
1       2
```

Press 〔2〕 to exit data input without registering the value you just input.

Press 〔1〕 if you want to register the value you just input, without saving it in memory. If you do this, however, you will not be able to display or edit any of the data you have input.

- To delete data you have just input, press 〔SHIFT〕〔M+〕(CL).
- After inputting statistical data in the SD Mode or REG Mode, you will be unable to display or edit individual data items any longer after perform either the following operations.
    Changing to another mode
    Changing the regression type (Lin, Log, Exp, Pwr, Inv, Quad)

Regression Calculations (REG) (fx-82MS/fx-85MS/fx-300MS/fx-350MS only)

Use the 〔MODE〕 key to enter the REG Mode when you want to perform statistical calculations using regression.

〔MODE〕〔3〕(REG)
```
Lin Log Exp →
1   2   3
```

- In the SD Mode and REG Mode, the 〔M+〕 key operates as the 〔DT〕 key.
- Entering the REG Mode displays screens like the ones shown below.

```
Lin Log Exp →
1   2   3
```

⏵ ↓   ↑ ⏴

```
←Pwr Inv Quad
1    2   3
```
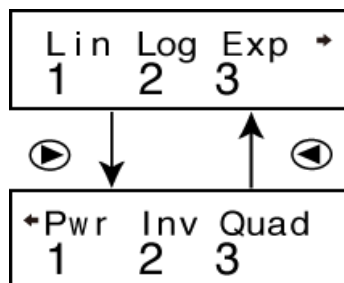
- Press the number key (〔1〕, 〔2〕, or 〔3〕) that corresponds to the type of regression you want to use.
    〔1〕(Lin) : Linear regression
    〔2〕(Log) : Logarithmic regression
    〔3〕(Exp) : Exponential regression

$\blacktriangleright$ $\boxed{1}$(Pwr) : Power regression
$\blacktriangleright$ $\boxed{2}$(Inv) : Inverse regression
$\blacktriangleright$ $\boxed{3}$(Quad) : Quadratic regression

- Always start data input with $\boxed{\text{SHIFT}}$ $\boxed{\text{MODE}}$(CLR)$\boxed{1}$(Scl)$\boxed{=}$ to clear statistical memory.
- Input data using the key sequence shown below.
    $<x$-data>$\boxed{,}$$<y$-data>$\boxed{\text{DT}}$
- The values produced by a regression calculation depend on the values input, and results can be recalled using the key operations shown in the table below.

To recall this type of value:	Perform this key operation:
Σx^2	$\boxed{\text{SHIFT}}$ $\boxed{1}$(S-SUM)$\boxed{1}$(Σx^2)
Σx	$\boxed{\text{SHIFT}}$ $\boxed{1}$(S-SUM)$\boxed{2}$(Σx)
n	$\boxed{\text{SHIFT}}$ $\boxed{1}$(S-SUM)$\boxed{3}$(n)
Σy^2	$\boxed{\text{SHIFT}}$ $\boxed{1}$(S-SUM)$\blacktriangleright$$\boxed{1}$($\Sigma y^2$)
Σy	$\boxed{\text{SHIFT}}$ $\boxed{1}$(S-SUM)$\blacktriangleright$$\boxed{2}$($\Sigma y$)
Σxy	$\boxed{\text{SHIFT}}$ $\boxed{1}$(S-SUM)$\blacktriangleright$$\boxed{3}$($\Sigma xy$)
$\bar{x}$	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\boxed{1}$($\bar{x}$)
σ_x	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\boxed{2}$(σ_x)
s_x	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\boxed{3}$(s_x)
$\bar{y}$	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\boxed{1}$($\bar{y}$)
σ_y	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\boxed{2}$($\sigma_y$)
s_y	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\boxed{3}$($s_y$)
Regression coefficient A	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\blacktriangleright$$\boxed{1}$(A)
Regression coefficient B	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\blacktriangleright$$\boxed{2}$(B)
Regression calculation other than quadratic regression	
Correlation coefficient r	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\blacktriangleright$$\boxed{3}$(r)
$\hat{x}$	$\boxed{\text{SHIFT}}$ $\boxed{2}$(S-VAR)$\blacktriangleright$$\blacktriangleright$$\blacktriangleright$$\boxed{1}$($\hat{x}$)

To recall this type of value:	Perform this key operation:
$\hat{y}$	$\boxed{\text{SHIFT}}\ \boxed{2}$ (S-VAR) ▶ ▶ ▶ $\boxed{2}$ ($\hat{y}$)

- The following table shows the key operations you should use to recall results in the case of quadratic regression.

To recall this type of value:	Perform this key operation:
Σx^3	$\boxed{\text{SHIFT}}\ \boxed{1}$ (S-SUM) ▶ ▶ $\boxed{1}$ (Σx^3)
$\Sigma x^2 y$	$\boxed{\text{SHIFT}}\ \boxed{1}$ (S-SUM) ▶ ▶ $\boxed{2}$ ($\Sigma x^2 y$)
Σx^4	$\boxed{\text{SHIFT}}\ \boxed{1}$ (S-SUM) ▶ ▶ $\boxed{3}$ (Σx^4)
Regression coefficient C	$\boxed{\text{SHIFT}}\ \boxed{2}$ (S-VAR) ▶ ▶ $\boxed{3}$ (C)
$\hat{x}_1$	$\boxed{\text{SHIFT}}\ \boxed{2}$ (S-VAR) ▶ ▶ ▶ $\boxed{1}$ ($\hat{x}_1$)
$\hat{x}_2$	$\boxed{\text{SHIFT}}\ \boxed{2}$ (S-VAR) ▶ ▶ ▶ $\boxed{2}$ ($\hat{x}_2$)
$\hat{y}$	$\boxed{\text{SHIFT}}\ \boxed{2}$ (S-VAR) ▶ ▶ ▶ $\boxed{3}$ ($\hat{y}$)

- The values in the above tables can be used inside of expressions the same way you use variables.

Linear Regression
- The regression formula for linear regression is: $y = A + Bx$.

Example: Atmospheric Pressure vs. Temperature
Perform linear regression to determine the regression formula terms and correlation coefficient for the data below.

Temperature	Atmospheric Pressure
10°C	1003 hPa
15°C	1005 hPa
20°C	1010 hPa
25°C	1011 hPa
30°C	1014 hPa

Next, use the regression formula to estimate atmospheric pressure at -5°C and temperature at 1000 hPa. Finally, calculate the coefficient of determination (r^2) and sample covariance ($\dfrac{\Sigma xy - n \cdot \bar{x} \cdot \bar{y}}{n - 1}$).

In the REG Mode:
[1](Lin)
[SHIFT] [MODE](CLR)[1](Scl)[=](Stat clear)

10 [,] 1003 [DT]

	REG
n=	1.

Each time you press [DT] to register your input, the number of data input up to that point is indicated on the display (*n* value).

15 [,] 1005 [DT] 20 [,] 1010 [DT] 25 [,] 1011 [DT] 30 [,] 1014 [DT]

Regression Coefficient A = 997.4

[SHIFT] [2](S-VAR)⊳⊳[1](A)[=]   997.4

Regression Coefficient B = 0.56

[SHIFT] [2](S-VAR)⊳⊳[2](B)[=]   0.56

Correlation Coefficient r = 0.982607368

[SHIFT] [2](S-VAR)⊳⊳[3](r)[=]   0.982607368

Atmospheric Pressure at 5°C = 994.6

[(] [(-)]5[)] [SHIFT] [2](S-VAR)⊳⊳⊳[2]($\hat{y}$)

[=]   994.6

Temperature at 1000 hPa = 4.642857143

1000 [SHIFT] [2](S-VAR)⊳⊳⊳[1]($\hat{x}$)[=]   4.642857143

Coefficient of Determination = 0.965517241

[SHIFT] [2](S-VAR)⊳⊳[3](r)[x^2][=]   0.965517241

Sample Covariance = 35

[(] [SHIFT] [1](S-SUM)⊳[3](Σxy)[-]
[SHIFT] [1](S-SUM)[3](*n*)[×]
[SHIFT] [2](S-VAR)[1]($\bar{x}$)[×]
[SHIFT] [2](S-VAR)⊳[1]($\bar{y}$)[)][÷]
[(] [SHIFT] [1](S-SUM)[3](*n*)[-]1[)][=]   35.

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Logarithmic, Exponential, Power, and Inverse Regression

- Use the same key operations as linear regression to recall results for these types of regression.
- The following shows the regression formulas for each type of regression.

Logarithmic Regression	$y = A + B \cdot \ln x$
Exponential Regression	$y = A \cdot e^{B \cdot x}$ ($\ln y = \ln A + Bx$)
Power Regression	$y = A \cdot x^B$ ($\ln y = \ln A + B\ln x$)
Inverse Regression	$y = A + B \cdot 1/x$

Quadratic Regression

- The regression formula for quadratic regression is: $y = A + Bx + Cx^2$.

Example:

Perform quadratic regression to determine the regression formula terms for the data below.

x_i	y_i
29	1.6
50	23.5
74	38.0
103	46.4
118	48.0

Next, use the regression formula to estimate the values for $\hat{y}$ (estimated value of y) for x_i = 16 and $\hat{x}$ (estimated value of x) for y_i = 20.

In the REG Mode:
▶ 3 (Quad)
SHIFT MODE (CLR) 1 (Scl) = (Stat clear)

29 , 1 . 6 DT 50 , 23 . 5 DT 74 , 38 . 0 DT 103 , 46 . 4 DT 118 , 48 . 0 DT

Regression Coefficient A = -35.59856934

<div align="center">SHIFT 2 (S-VAR) ▶ ▶ 1 (A) =   -35.59856934</div>

Regression Coefficient B = 1.495939413

$$\boxed{\text{SHIFT}}\ \boxed{2}\ (\text{S-VAR}) \circledR \circledR \boxed{2}\ (B) \boxed{=} \qquad\qquad 1.495939413$$

Regression Coefficient C = $-6.71629667 \times 10^{-3}$

$$\boxed{\text{SHIFT}}\ \boxed{2}\ (\text{S-VAR}) \circledR \circledR \boxed{3}\ (C) \boxed{=} \qquad\qquad -6.71629667 \times 10^{-3}$$

$\hat{y}$ when x_i is 16 = -13.38291067

$$16\ \boxed{\text{SHIFT}}\ \boxed{2}\ (\text{S-VAR}) \circledR \circledR \circledR \boxed{3}\ (\hat{y}) \boxed{=} \qquad\qquad -13.38291067$$

$\hat{x}_1$ when y_i is 20 = 47.14556728

$$20\ \boxed{\text{SHIFT}}\ \boxed{2}\ (\text{S-VAR}) \circledR \circledR \circledR \boxed{1}\ (\hat{x}_1) \boxed{=} \qquad\qquad 47.14556728$$

$\hat{x}_2$ when y_i is 20 = 175.5872105

$$20\ \boxed{\text{SHIFT}}\ \boxed{2}\ (\text{S-VAR}) \circledR \circledR \circledR \boxed{2}\ (\hat{x}_2) \boxed{=} \qquad\qquad 175.5872105$$

Data Input Precautions

- $\boxed{\text{DT}}\ \boxed{\text{DT}}$ inputs the same data twice.
- You can also input multiple entries of the same data using $\boxed{\text{SHIFT}}\ \boxed{,}\ (;)$. To input the data "20 and 30" five times, for example, press 20 $\boxed{,}$ 30 $\boxed{\text{SHIFT}}\ \boxed{,}\ (;)$ 5 $\boxed{\text{DT}}$.
- The above results can be obtained in any order, and not necessarily that shown above.
- Precautions when editing data input for standard deviation also apply for regression calculations.
- Do not use variables A through F, X, or Y to store data when performing statistical calculations. These variables are used for statistical calculation temporary memory, so any data you may have assigned to them may be replaced by other values during statistical calculations.
- Entering the REG Mode and selecting a regression type (Lin, Log, Exp, Pwr, Inv, Quad) clear variables A through F, X, and Y. Changing from one regression type to another inside the REG Mode also clears these variables.

Technical Information

Errors

The calculator will display an error message whenever an error occurs for any reason during a calculation.
- Press ◀ or ▶ to return to the calculation screen. The cursor will be positioned at the location where the error occurred, ready for input. Make the necessary corrections to the calculation and execute it again.
- Press [AC] to return to the calculation screen. Note that this also clears the calculation that contained the error.

Error Messages

Math ERROR
Cause:
- The intermediate or final result of the calculation you are performing exceeds the allowable calculation range.
- Your input exceeds the allowable input range.
- The calculation you are performing contains an illegal mathematical operation (such as division by zero).

Action:
- Check the input values and reduce the number of digits.
- When using independent memory or a variable as the argument of a function, make sure that the memory or variable value is within the allowable range for the function.

Stack ERROR
Cause:
- The calculation you are performing has caused the capacity of the numeric stack or the command stack to be exceeded.

Action:
- Simplify the calculation expression.
- Try splitting the calculation into two or more parts.

Syntax ERROR
Cause:
- There is a problem with the format of the calculation you are performing.

Action:
- Make necessary corrections.

Arg ERROR
Cause:

• Improper use of an argument.

Action:

• Make necessary corrections.

Before Assuming Malfunction of the Calculator...

Perform the following steps whenever an error occurs during a calculation or when calculation results are not what you expected.
Note that you should make separate copies of important data before performing these steps.

1. Check the calculation expression to make sure that it does not contain any errors.
2. Make sure that you are using the correct mode for the type of calculation you are trying to perform.
3. If the above steps do not correct your problem, press the [ON] key.
4. Initialize all modes and settings by performing the following operation.
   fx-82MS/fx-85MS/fx-300MS/fx-350MS: [ON] [SHIFT] [MODE] (CLR) [2] (Mode) [=]
   fx-220 PLUS: [ON] [CLR] [2] (Mode) [=]
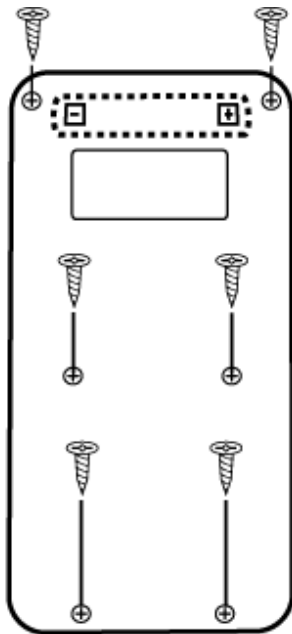
Replacing the Battery

The battery needs to be replaced after a specific number of years. Also, replace the battery immediately after display figures become dim.
A low battery is indicated by a dim display, even if contrast is adjusted, or by failure of figures to appear on the display immediately after you turn on the calculator. If this happens, replace the battery with a new one.
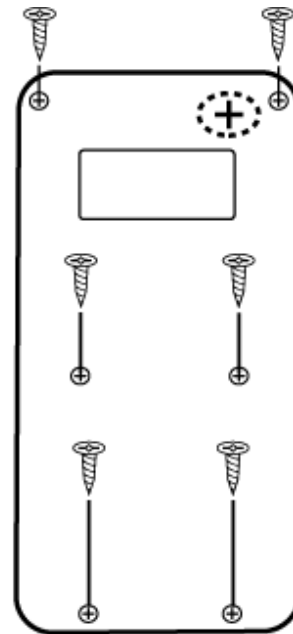
Important!

• Removing the battery will cause all of the calculator's memory contents to be deleted.

1. Press [SHIFT] [AC] (OFF) to turn off the calculator.
2. On the back of the calculator, remove the screws and the cover.

fx-82MS/fx-220 PLUS

fx-85MS/fx-300MS/
fx-350MS

3. Remove the battery, and then load a new battery with its plus (+) and minus (-) ends facing correctly.
4. Replace the cover.
5. Initialize the calculator.
   fx-82MS/fx-85MS/fx-300MS/fx-350MS: [ON] [SHIFT] [MODE] (CLR) [3] (All) [=]
   fx-220 PLUS: [ON] [CLR] [3] (All) [=]
   • Do not skip the above step!

Calculation Priority Sequence

The calculator performs calculations according to a calculation priority sequence.
When the priority of two expressions is the same, the calculation is performed from left to right.

1	Function with parentheses: Pol(x, y), Rec(r, θ), RanInt#(a, b)* (*fx-220 PLUS only)
2	Type A functions: With these functions, the value is entered and then the function key is pressed. (x^3, x^2, x^{-1}, $x!$, $° ' "$, $\hat{x}$, $\hat{x}_1$, $\hat{x}_2$, $\hat{y}$, $°$, ^{r}, ^{g})
3	Powers and roots: x^y, $^x\sqrt{}$
4	Fractions

5	Implied multiplication of π, e (natural logarithm base), memory name, or variable name: 2π, $3e$, 5A, πA, etc.
6	Type B functions: With these functions, the function key is pressed and then the value is entered. ($\sqrt{}$, $\sqrt[3]{}$, log, ln, e^x, 10^x, sin, cos, tan, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$, sinh, cosh, tanh, $\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$, (-))
7	Implied multiplication of Type B functions: $2\sqrt{3}$, Alog2, etc.
8	Permutation ($n\mathrm{P}r$), combination ($n\mathrm{C}r$)
9	Multiplication, division (×, ÷)
10	Addition, subtraction (+, -)

- The negative sign (-) is treated as a Type B function, so particular care is required when the calculation includes a high-priority Type A function, or power or root operations.
  Example: $(-2)^4 = 16$; $-2^4 = -16$

Stacks

This calculator uses memory areas, called "stacks," to temporarily store values (numeric stack) and commands (command stack) according to their precedence during calculations. The numeric stack has 10 levels and the command stack has 24 levels. A stack error (Stack ERROR) occurs whenever you try to perform a calculation that is so complex that the capacity of a stack is exceeded.

Example:
$2 \times ((3 + 4 \times (5 + 4) \div 3) \div 5) + 8 =$
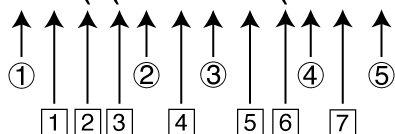
Numeric Stack

①	2
②	3
③	4
④	5
⑤	4
⋮	

Command Stack

1	×
2	(
3	(
4	+
5	×
6	(
7	+
⋮	

- Calculations are performed in sequence according to "Calculation Priority Sequence." Commands and values are deleted from the stack as the calculation is performed.

Calculation Ranges, Number of Digits, and Precision

The calculation range, number of digits used for internal calculation, and calculation precision depends on the type of calculation you are performing.

Calculation Range and Precision

Calculation Range	$\pm1 \times 10^{-99}$ to $\pm9.999999999 \times 10^{99}$ or 0
Number of Digits for Internal Calculation	15 digits
Precision	In general, ±1 at the 10th digit for a single calculation. Precision for exponential display is ±1 at the least significant digit. Errors are cumulative in the case of consecutive calculations.

Function Calculation Input Ranges and Precision

Functions	Input Range	
$\sin x$ $\cos x$	Deg	$0 \leqq |x| < 9 \times 10^9$
	Rad	$0 \leqq |x| < 157079632.7$
	Gra	$0 \leqq |x| < 1 \times 10^{10}$
$\tan x$	Deg	Same as $\sin x$, except when $|x| = (2n\text{-}1) \times 90$.
	Rad	Same as $\sin x$, except when $|x| = (2n\text{-}1) \times \pi/2$.
	Gra	Same as $\sin x$, except when $|x| = (2n\text{-}1) \times 100$.
$\sin^{-1} x$, $\cos^{-1} x$	$0 \leqq |x| \leqq 1$	
$\tan^{-1} x$	$0 \leqq |x| \leqq 9.999999999 \times 10^{99}$	
$\sinh x$, $\cosh x$	$0 \leqq |x| \leqq 230.2585092$	
$\sinh^{-1} x$	$0 \leqq |x| \leqq 4.999999999 \times 10^{99}$	
$\cosh^{-1} x$	$1 \leqq x \leqq 4.999999999 \times 10^{99}$	
$\tanh x$	$0 \leqq |x| \leqq 9.999999999 \times 10^{99}$	
$\tanh^{-1} x$	$0 \leqq |x| \leqq 9.999999999 \times 10^{-1}$	
$\log x$, $\ln x$	$0 < x \leqq 9.999999999 \times 10^{99}$	
10^x	$-9.999999999 \times 10^{99} \leqq x \leqq 99.99999999$	
e^x	$-9.999999999 \times 10^{99} \leqq x \leqq 230.2585092$	
$\sqrt{x}$	$0 \leqq x < 1 \times 10^{100}$	
x^2	$|x| < 1 \times 10^{50}$	
x^{-1}	$|x| < 1 \times 10^{100}$; $x \neq 0$	
$\sqrt[3]{x}$	$|x| < 1 \times 10^{100}$	

Functions	Input Range
$x!$	$0 \leqq x \leqq 69$ (x is an integer)
$n \mathrm{P} r$	$0 \leqq n < 1 \times 10^{10}$, $0 \leqq r \leqq n$ (n, r are integers) $1 \leqq \{n!/(n-r)!\} < 1 \times 10^{100}$
$n \mathrm{C} r$	$0 \leqq n < 1 \times 10^{10}$, $0 \leqq r \leqq n$ (n, r are integers) $1 \leqq n!/r! < 1 \times 10^{100}$ or $1 \leqq n!/(n-r)! < 1 \times 10^{100}$
Pol(x, y)	$\|x\|, \|y\| \leqq 9.999999999 \times 10^{99}$ $\sqrt{x^2 + y^2} \leqq 9.999999999 \times 10^{99}$
Rec(r, θ)	$0 \leqq r \leqq 9.999999999 \times 10^{99}$ θ: Same as $\sin x$
°’”	$a°b'c”$: $\|a\|, b, c < 1 \times 10^{100}$; $0 \leqq b, c$ The display seconds value is subject to an error of ±1 at the second decimal place.
$\overset{\leftarrow}{°’”}$	$\|x\| < 1 \times 10^{100}$ Decimal ↔ Sexagesimal Conversions $0°0'0° \leqq \|x\| \leqq 9999999°59°$
x^y	$x > 0$: $-1 \times 10^{100} < y\log x < 100$ $x = 0$: $y > 0$ $x < 0$: $y = n$, $\frac{1}{2n+1}$ (n is an integer) However: $-1 \times 10^{100} < y\log\|x\| < 100$
$\sqrt[x]{y}$	$y > 0$: $x \neq 0$, $-1 \times 10^{100} < 1/x \, \log y < 100$ $y = 0$: $x > 0$ $y < 0$: $x = 2n+1$, $\frac{1}{n}$ ($n \neq 0$; n is an integer) However: $-1 \times 10^{100} < 1/x \, \log\|y\| < 100$
$a^{b/c}$	Total of integer, numerator, and denominator must be 10 digits or less (including division marks).
RanInt#(a, b)	$a < b$; $\|a\|, \|b\| < 1 \times 10^{10}$; $b - a < 1 \times 10^{10}$ (a, b are integers)

• Precision is basically the same as that described under "Calculation Range and Precision", above.

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- Calculations that use any of the functions or settings shown below require consecutive internal calculations to be performed, which can cause accumulation of error that occurs with each calculation.
  x^y, $\sqrt[x]{y}$, $\sqrt[3]{}$, $x!$, $n\mathrm{P}r$, $n\mathrm{C}r$; °, ^{r}, ^{g} (Angle unit: Rad); σ_x, s_x, regression coefficient.
- Error is cumulative and tends to be large in the vicinity of a function's singular point and inflection point.
- During statistical calculation, error is cumulative when data values have a large number of digits and the differences between data values is small. Error will be large when data values are greater than six digits.

Specifications

fx-82MS/fx-220 PLUS

Power Requirements:
AAA-size battery R03 (UM-4) × 1

Approximate Battery Life:
Two years (based on one hour of operation per day)

Power Consumption:
0.0001 W

Operating Temperature:
0°C to 40°C (32°F to 104°F)

Dimensions:
13.8 (H) × 77 (W) × 161.5 (D) mm
½" (H) × 3" (W) × 6⅜" (D)

Approximate Weight:
105 g (3.7 oz) including the battery

fx-85MS/fx-300MS

Power Requirements:
Built-in solar cell; button battery LR44 × 1

Approximate Battery Life:
Three years (based on one hour of operation per day)

Operating Temperature:
0°C to 40°C (32°F to 104°F)

Dimensions:

11.1 (H) × 77 (W) × 161.5 (D) mm

⅜" (H) × 3" (W) × 6⅜" (D)

Approximate Weight:

95 g (3.4 oz) including the battery

▍fx-350MS

Power Requirements:

Button battery LR44 × 1

Approximate Battery Life:

Three years (based on one hour of operation per day)

Power Consumption:

0.0001 W

Operating Temperature:

0°C to 40°C (32°F to 104°F)

Dimensions:

11.1 (H) × 77 (W) × 161.5 (D) mm

⅜" (H) × 3" (W) × 6⅜" (D)

Approximate Weight:

95 g (3.4 oz) including the battery

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